Cutting open the other side of the cocoon, I found that the pupa shell was sucked nearly dry of its contents. The *Cecropia* cocoons occur commonly on white maples and are generally placed near the ends of the long drooping branches, and it will be seen from the foregoing that it is probably the safest situation afforded by the tree. If a woodpecker is successful in making a hole into a cocoon, it is, nevertheless, sometimes disappointed at its contents. I have found a cocoon that contained the tough pupa case of the *Ophion* ichneumon fly, that had been drilled in the side by a woodpecker, and then abandoned, leaving the parasite unharmed.

THE CLASSIFICATION OF THE SATURNIIDES.

By A. RADCLIFFE GROTE, A. M.

The publication by Dr. Dyar* of a critical notice of my recent paper (June, 1896)† on the *Saturniides*, affords me, in replying, the opportunity of briefly stating the characters which I found in the group. I founded the two families into which the superfamily naturally divides (any other division being in my opinion unnatural) as follows:

Vein IV_2 anastomosing with IV_1 .....SATURNIIDÆ.
Vein IV_2 out of the cross-vein .....AGLIIDÆ.

Perhaps some reason should have been given by Dr. Dyar for calling this fundamental difference in the neuration "artificial," while contrasting it with a "natural classification which should combine several such special ones." But this combination does not exist; it remains ideal. It reminds one of the hazy statement, that we must take characters from all parts of the insect, which procedure, without a strict weighing of values, would lead us nowhere. But the fact is, that although I have taken the structure of the Radius as the principal character, determining as it does the dichotomous division of the superfamily, I have not left out of sight the characters of differentiation offered by the larvæ and cocoons. I have worked out the gradual modifications of the Radius in the highest of the two families. I have not "selected" a random or arbitrary character, which would in the end fail. I have been obliged to take the fundamental character which carries with it all

* Can. Ent. XXVIII, 270.

† Mittheilungen aus dem Roemer Museum zu Hildesheim, No. 6.

the rest. And this proves the value, that the character does not fail. *

The adverse statement fails, when I show, that in the larval specialization (the diminution of the tubercles and armature), the antennal structure (the attainment of the equally lengthy pectinations), the neuration and the complexity in the attachment of the cocoon, a consonant direction is held and a perfectional advance throughout the *Saturniidæ* (including *Hemileuca*). Dr. Dyar's statement that I have transposed the position accorded by him to *Hemileuca* and *Aglia* is strictly correct and, as I try to show here, entirely defensible. The former, Dr. Dyar would place with the *Automeris* group on account of the stinging spines. But I prefer to consider the eversible glands and stinging spines of the caterpillar as here characters of convergence. Their presence is explainable by the consideration that both *Hemileuca* and *Automeris* have probably arisen or diverged from a common point nearer the basis of the phyllum. It is easier to see that the stinging spines are a subordinate character when we find them again in unrelated groups: e. g. *Apodidæ*. It is not possible for me to "suppose that vein IV_2 has moved towards IV_1 in *Hemileuca* separately from the type of *Attacus* and *Saturnia* where this process is congenital." Since I show that the type is fully attained in *Hemileuca*, it is plainly already congenital in the *Hemileucinæ*. The real morphological value of this "movement" is strangely underrated by Dr. Dyar. In reality it is profound. It amounts to a reorganization of the wing through the action of the Radius upon another pattern. In a paper subsequently read by me at the Frankfort meeting, I have tried to trace the process by which the lower and more generalized Agliid wing has passed into the higher, more specialized Saturniid type. The difference, as we now find it, is, relatively speaking, primary, palingenetic, not adaptory and secondary, as appears to me the change of the armature into stinging spines.

With reference to *Aglia*, which I believe to be a specialized and very much isolated type, I regard it as having left the main Agliid stem before the devolution of *Citheronia* as we now find this group. The loss of the pair of anal tubercles is to be set down solely to the *Citheroniinæ*. I do not derive *Algia* from *Citheronia*, but from the stem before *Citheronia*. Dr. Dyar charges me with entertaining more

* Since my paper went to press, the Roemer Museum has received additional material of South American *Saturniides* in all stages. In a paper read September 23d, at the Frankfort meeting, I show that in all the new material the characters pointed out by me hold good and sustain my general classification.

beliefs than I am conscious of possessing. I think I should believe with difficulty that a purely structural character, not correlated with habit, could be twice evolved in the same limited group. But I certainly have believed that the larva of *Aglia* is derived from the main stem of the family *Agliidæ* and quite independent of the *Saturniidæ*, and I believe this still. I think that these supposed contradictory larval characters can be straightened out to accord with my classification. It seems to me that Dr. Dyar has failed to notice my genealogical tree in its vertical aspect. My friend is not impressed as I hoped he might be with this magnificent specimen of zoölogical gardening. The vertical sequence is:

Attacus,
Saturnia,
Aglia,
Hemileuca,
Citheronia.

But I have separated the interlacing branches and show that there are two natural main stems, to the higher of which I most decidedly refer *Hemileuca*. *Aglia* has so grown over toward the Saturnians that Dr. Dyar fails to find its real issue. It does not follow, because Dr. Dyar has converted me fully to the value of the larval tubercles, that I should be equally fortunate, on a much more modest scale, and bring him round to the transposition of *Hemileuca* and *Aglia*. But I may hope to do so. In my original paper I am much indebted to Dr. Dyar for information, without which I could not have cleared the superfamily from alien families which had found place in it, nor have made my paper so complete. This gratitude is not in the slightest way impaired by my attempt to rescue my classification in this one particular from an adverse criticism. I am glad of the occasion to insist upon the seeming greater reasonableness of my views.

The difficulty in the way of believing that *Hemileuca* has independently attained the type of *Saturnia* lies in the physiological steps of the progress. It appears to Dr. Dyar to be merely an approaching of vein IV_2 to vein IV_1 at base, but I have shown that vein IV_2 remains nearly quiescent; it is the cross-vein which becomes transformed so as to form a continuous part of the vein.* It is part of a general mor-

* As I have shown, the cross-vein between IV_2 and IV_1 becomes oblique in *Aglia* and *Citheronia*, and shows a step towards *Saturnia* or *Hemileuca*; therefore, so far as the radial evolution is concerned, the two first are the lower. The affinity of *Aglia* and *Citheronia* lies in the fact, that in both groups the initiatory movement is displayed. Hence I derive *Aglia* from the main stem before *Citheronia* and after *Automeris* had left it.

phological change in the structure of the wing, tending to the obliteration of the cross-vein, the permanent attachment of the two upper branches of the median vein to the Radial series and of the lower branch to the Cubitus. Such a grand alteration in the pattern of the neuration must take place through a series of gradual steps, no one of which is fortuitous. To suppose that a member of the Aglid series of a low type (vein VIII of secondaries being retained) could attain such a stage as *Hemileuca* presents, presupposes a total subversion of structural sequence. No one, I think, who had studied the neuration attentively could entertain so violent a view. I close this reply to Dr. Dyar's otherwise kind notice with a confession of my inability to understand what it is in the spacing of the analytical table which makes it unintelligible, and a recapitulation of the characters of the higher structural groups of the *Saturniides* as established by me. I conclude that the classification is plain and obvious and is preferable to the obscure characters upon which Dr. Dyar would regard *Aglia* and *Hemileuca* as types of distinct families. So far as my studies go I have found no grounds for increasing the family types in the *Saturniides*, since all the genera examined by me fall naturally and easily into their places under one or the other of the two families limited in my paper.

Radius 5-branched..... .....SPHINGIDES.
Radius 3–4-branched..... SATURNIIDES.
(1) Vein IV_2 anastomosing with IV_1.....SATURNIIDÆ.
Cell open.....ATTACINÆ. 1.
Cell closed.
Hind wings wanting vein VIII.....SATURNIINÆ. 2.
Hind wings with VIII present.....HEMILEUCINÆ. 3.
(2) Vein IV_2 from the cross-vein .....AGLIIDÆ.
Cell apically depressed.
Hind wings wanting vein VIII .....AGLIINÆ. 4.
Hind wings with vein VIII present.....CITHERONIINÆ. 6.
Cell rectangular.....AUTOMERINÆ. 5.

In view of the radius being 5-branched and the internal vein (VIII) of the secondaries being retained throughout, I consider the *Sphingides* as lower, less specialized, than the *Saturniides*. But, since both groups are parallel, both rooting in the *Tineides*, their relative position in a linear arrangement is less important and, as I say in the "Systema," I have tried to keep the original sequence of Linné where this can be done without violence. In this case there may be other points, such as the specialized larvæ, the advanced prothorax and salient head, the narrow wings and the cylindrical and tapering abdomen, all fitting the

moths for their arrowy flight, which may balance the lower type of neuration in the Hawk moths. A result of my recent studies is the recognition of the compact structure of the *Sphingides*, so that I return to a view published by me a long time ago, but since practically abandoned, that the family *Sphingidæ* is probably only susceptible of tribal division. Such an instance does not occur a second time in the Lepidoptera, the series, certainly until we come to *Acherontia*, affording me no character which seems of sub-family value, corresponding in any way to the features which I have used as basis for these groups in the *Saturniides*.

OETA FLORIDANA *Neumoegen.*

By HARRISON G. DYAR, PH.D.

Mr. Neumoegen briefly described this form (Can. Ent., xxiii, 123) as a variety of *O. aurea* Fitch, from the upper Indian River, Florida. I have been acquainted with the larva for some time at Lake Worth and Miami, but only recently bred them to imago. The larvæ live gregariously in a large, loose and open web among the leaves of the bitterwood tree, *Simaruba glauca*. They are unusually long and slender, of a dark brown color, and remaining motionless in the web, look like pieces of sticks accidently caught in a spider's web. The pupa is formed in the same location and is colored in the same manner.

O. floridana, larva. Slender, the abdominal segments elongated, one-half longer than thick, the thoracic segments not unusually elongated. Head rounded, scarcely bilobed, prominent and proportionately large; black, a labial line, bases of antennæ, and the tubercles of the setæ white; width 2 mm. Thoracic feet large and well developed, the abdominal ones small, short, the crotchets simple, distributed rather regularly over the surface of the plant, not in rows. Setæ simple, the subprimaries present. The prothoracic shield is united with the pre-spiracular tubercle, forming a large shield, bearing the usual nine setæ; subventral tubercle with three setæ. Mesothorax with ia and ib, iia and iib, iv and v approximate, iii remote, vi with two setæ. Abdominal setæ somewhat modified on account of the lengthening of the segments; iv and v are drawn far apart and, though not more out of line than is frequent, v is slightly the more dorsad of the two, which, together with its remote position, suggests somewhat the condition found in the Sphingidæ. Tubercles i and ii are nearly in line, iv is small and vi very large; vii is composed of one large and two small setæ above the base of the foot. Otherwise normal.

Color chocolate brown; a broad orange-brown dorsal band, reaching to tubercle ii and along joints 3 to 12, contains a dorsal row of small white spots and a similar border on each side; a row of tiny white dots above tubercle iii; another broad brown band subventrally, from tubercles v to vii and joints 4 to 11, bordered above by a narrow pulverulent white line; a dark spot on tubercle vi; spiracles pale; setæ white; length 25 to 30 mm.